GROWING PEACHES EAST OF THE ROCKY MOUNTAINS

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For more detailed information on the production of peaches, refer to Agriculture Handbook 280, "Peach Production East of the Rocky Mountains," available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at 35 cents a copy.

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GROWING PEACHES
EAST OF THE ROCKY MOUNTAINS

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Peach trees will grow in most States east of the Rocky Mountains, but successful fruit production is generally limited to areas where the climate is temperate and humid (fig. 1).

Peaches can be grown successfully in some northern States if hardy varieties are planted, or if the orchard is protected from low-temperature extremes by a large body of water. But, where winter temperatures tend to drop below −15° F., only the hardiest varieties survive winter, and even these often fail to bear fruit.

Peach trees require some winter chilling to promote normal shoot growth and blossoming the next spring. Some varieties have short chilling requirements, but even these often fail to bear fruit in Florida, southern Georgia, and the southern parts of the States bordering the Gulf of Mexico because the winters are too mild.

Low temperatures during the winter and lack of moisture during the growing season generally limit peach growing in most of the Great Plains States.

SELECTING ORCHARD SITES

Soil and local climatic conditions are the most important matters to consider when selecting a planting site for a peach orchard.

Soil

Peach trees thrive on a variety of well-drained soils, ranging from coarse sand to fine-textured clay loams. A deep, well-drained soil of medium texture is ideal for peach growing.

Heavy, compact clay soils that have poor drainage are the least desirable for peach growing. Poor drainage may also be a problem on lighter soils that are underlain by impervious clay, hardpan, or rock.

Because of their low water-holding capacity, light, shallow soils may be unsuitable for peach growing in areas where summer droughts occur and irrigation is not practiced.

Climate

In most peach-growing areas east of the Rocky Mountains, orchard sites that provide peach trees some protection from spring frosts and low winter temperatures should be selected.

Because cold air moves to lower levels, peach trees planted on land that is somewhat higher than the surrounding area are less likely to be injured by frost than trees

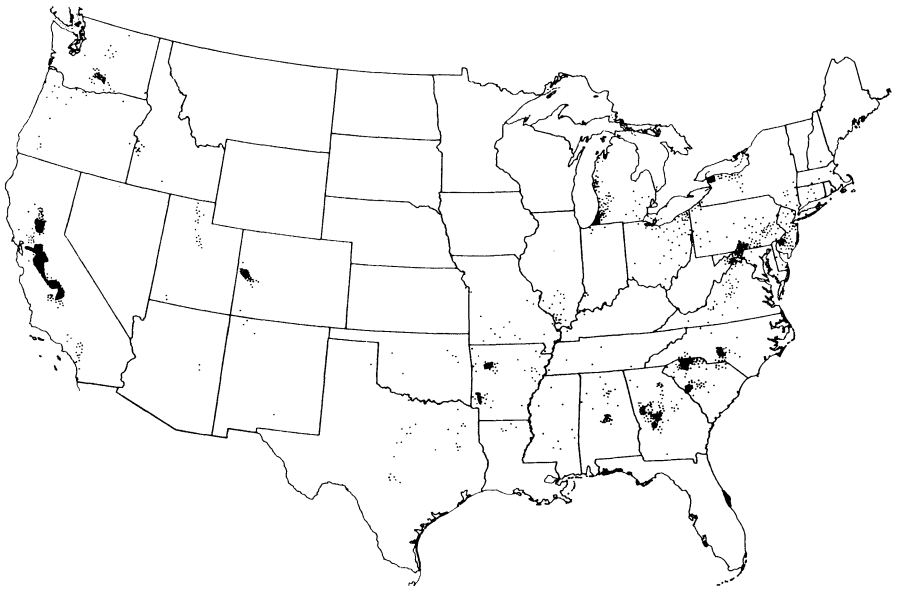

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Figure 1.—Location of principal peach plantings in the United States. The greatest concentrations of plantings are in California, South Carolina, Georgia, and Michigan.

planted on adjoining land at lower elevations. A hilltop location, however, may have a disadvantage if it exposes trees to cold, drying winds during the winter.

Level or gently sloping land may be suitable for peach orchards if the climate is mild, or if a large, nearby body of water provides protection from spring frosts and low temperatures. Good examples of the protection provided by large bodies of water are the eastern shore of Lake Michigan and the southern shore of Lake Ontario.

SELECTING NURSERY-GROWN TREES

Most peach growers find that purchasing trees from a reliable nursery is more advantageous than propagating their own trees.

One-year-old nursery-grown trees, 4 to 6 feet tall, are ideal for planting. June-budded trees, 2 to 3 feet tall, are also satisfactory and are preferred by many growers.

A 1-year-old tree has had one complete season of growth in the nursery after being budded. A June-budded tree is budded early in the first summer and dug at the end of the same season. June-budded trees may be straight, unbranched whips, or they may have a few branches; 1-year-old trees are often well branched.

PLANTING

Well-hardened, dormant peach trees may be transplanted from the nursery to the orchard in late fall, winter, or early spring. Generally, the best time for transplanting

peach trees ranges from late fall or early winter in the South to late winter or early spring in the North.

Trees that arrive from the nursery at an unsuitable planting time should be heeled-in to prevent the roots from drying out. Dig a trench in a well-drained place. Lay the trees on the side of the trench in a sloping position and cover the roots with soil. If planting must be delayed for some time, the soil should be packed tightly around the roots.

Trees can be protected for short periods by wrapping moistened burlap, sawdust, or old straw around the roots. Store the trees in a cool place and keep the roots moist.

Spacing

Peach trees are usually set in some rectangular pattern so that tillage and other cultural work can be done in any direction.

A square system is commonly used for planting orchards on level land, or on land that slopes no more than 5 feet per 100 feet. For commercial production, the space between the trees and the rows is usually 20 feet; wider spacing, which is used on certain soils and in certain areas, will make tillage and other cultural work easier.

Trees planted for home use, or where the planting space is limited, may be spaced as close as 15 feet apart and kept in bounds by pruning. This closer planting will reduce the amount of fruit produced, but trees of many varieties may still yield satisfactorily for local marketing or home use.

Planting trees on the contour will help reduce soil erosion in an orchard located on a slope. Where the slope is very steep, or where a broad watershed is located above the orchard site, it may be desirable to build terraces. Specific details for laying out a contoured or terraced orchard can be obtained from your county agricultural agent or the local technician for your soil conservation district.

Preparing the Site

On infertile soils that are low in organic matter it is a good practice to build up the soil by plowing under a green-manure crop before planting the orchard.

If the trees are planted on level or gently sloping land, the whole orchard area may be disked or plowed. Where contouring or terracing is being used, only the narrow strips of land for planting the tree rows need be prepared.

The planting holes for the trees should be 18 inches or more in diameter and deep enough to accommodate the root system. The holes can be dug with a spade, but if a large number of trees are being planted, digging the holes with a power-driven soil auger saves time.

Setting the Trees

Before planting the trees, remove broken or diseased roots. Additional root pruning is not necessary or desirable. If the tree roots have dried out in storage or transit, soak them in water for several hours or overnight. Keep the roots from

drying out or freezing while they are being planted.

In setting out a tree, hold it upright and place it in the hole 1 to 2 inches lower than the level at which it grew in the nursery. Fill in the space around the roots with topsoil. Work the soil in closely around the roots, and as the filling progresses, tamp the soil down around the roots. Fill the hole level with the ground surface. If the soil is dry, water should be added to the hole as it is being filled.

TRAINING AND PRUNING

The objective of pruning is to shape the tree during the early growing years so that it will support full crops of large, well-colored fruit during the bearing years.

Yearly pruning of bearing trees is important because peach trees bear fruit on wood produced the previous year. This fruiting wood tends to grow farther out on the ends of the branches each year. With no pruning, branches become extended and are easily broken by wind or a heavy load of fruit.

The Young Tree

When obtained from the nursery, most trees will be 2 to 6 feet tall and will have few lateral branches uniform enough to be used as scaffold, or framework, branches.

After the tree is planted, head back the main stem at 18 to 30 inches. Remove all lateral branches that arise below 12 inches from the ground. Cut back the remaining lateral branches to short stubs, each having one or two buds (fig. 2). This brings the top of the tree into balance with the root system and forces the tree to develop strong shoots.

In areas subject to severe winter cold, postpone the cutting back of fall-planted trees until late winter or early spring. June-budded trees may not be tall enough to need heading back.

As soon as the new shoots on the remaining lateral branches are 1 to 2 inches long, you can start selecting the scaffold branches (fig. 3).

A number of systems are used to train the young tree. The open-vase system is generally the preferred method because it promotes the de-

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Figure 2.—Pruning the young peach tree just after planting. The main stem is headed back and lateral branches are cut back to short stubs.

velopment of an open-centered tree. Some growers select two or three branches that form a wide-angled crotch (fig. 4). Other growers prefer three or four wide-angled branches well distributed around and up and down the trunk.

During the first growing season clip back all shoots and lateral branches except the selected scaffold branches.

Occasionally much of the treetop grows poorly the first year. But during the summer, a strong, vigorous shoot may arise near the base of the tree. If this shoot is upright and forms a sharp angle with the main trunk, the original treetop can be removed just above the base of the new shoot. The new shoot then will assume the position and function of the main trunk.

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Figure 4.—Four-year-old tree trained to the open-vase system. This strong, wide-angled crotch is resistant to winter injury and breakage by fruit weight.

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Figure 3.—New growth on a young peach tree about 3 weeks after planting. Scaffold limbs may now be selected and other shoots pinched back.

After 1 year's growth, the scaffold branches may need further training to force them to grow in an upward and outward direction. This can be done by removing or cutting back lateral branches that are not headed in the desired direction. Young trees should not be pruned heavily. Extra branches mean early production and rapid growth (fig. 5).

Peach trees usually start bearing some fruit the third year. If a good scaffold system has been established, the trees will need only light, corrective pruning for several years.

The Mature Tree

Most peach trees reach their most economical height (8 to 10 feet) when they are 6 to 8 years old. After reaching this height, the trees require fairly heavy pruning to keep them low and to promote the development of well-distributed fruit-bearing wood.

This pruning is largely a renewal process done by removing upright branches, thinning out shoots, and occasionally removing branches of 2- and 3-year-old wood.

With the renewal method of pruning, the largest branch on each well-developed crotch at the 8- to 10-foot level is removed just above or at the side of an outward branching lateral. This point is then used as a base for the renewal height.

Two or more branches usually develop at the renewal point the following summer. At the next pruning, remove all of these branches, except one outward branching shoot.

After several years change the renewal point to a position slightly higher or lower on the lateral (fig. 6). This will prevent the formation of a thick-topped tree.

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Figure 5.—Two-year-old peach tree after pruning. The tree has been pruned lightly to promote vigorous growth.

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Figure 6.—A strong, mature Elberta peach tree pruned to about 10 feet high. Growth renewal points are established throughout the tree.

The amount of new terminal growth produced on the tree each year serves as a guide in determining the amount of pruning needed. Try to maintain 12 to 15 inches of terminal growth throughout the tree. If pruning is too light, short, slender terminal shoots will be produced. If pruning is too heavy, vigorous shoots 18 inches or more in length will be produced.

In some cases, these conditions may be related to other operations affecting growth, rather than to the severity of pruning. To obtain the most productive tree growth, fertilizing, fruit thinning, and soil management must be inter-related with pruning. Poor terminal growth is often the fault of the soil fertility level rather than the pruning practice.

Time of Pruning

In most southern peach-growing areas, pruning can be done with safety any time between leaf fall and the start of growth in the spring.

In northern peach-growing areas where midwinter killing of buds, branches, and trunks sometimes occurs, pruning should be delayed until the main danger of such injury is past.

It may be desirable to prune twice in areas where there is a serious frost hazard. Make the major cuts

during the dormant season and then wait until the frost danger has passed before thinning the blossom twigs. Keep in mind, however, that the later pruning is done, the less it stimulates shoot growth and the more it reduces fruit production.

THINNING

Bearing peach trees usually set more fruit than they can properly mature. Some of this fruit will be thinned out by pruning, and some will drop naturally from the tree before reaching maturity. But many varieties require additional fruit thinning to promote the development of marketable-size fruit.

Early-ripening varieties that tend to set a heavy load of fruit should be thinned well before the June drop. Varieties that particularly benefit from early thinning include Mayflower, Earlired, Cardinal, Coronet, Cumberland, Golden Jubilee, Triogem, and Redhaven. Early thinning of these varieties will help promote the production of large, early maturing fruit. For example, in tests conducted at Beltsville, Md., successively later thinning caused smaller and later maturing fruit (table 1).

With midseason and late varieties, the usual practice is to wait until after the first drop before removing many of the small and imperfect fruits. The best results are obtained when thinning is done as soon as possible after the first drop. But if thining is delayed as late as into the pit-hardening period, it still has a beneficial effect on fruit size.

If a tree has a uniform set of fruit, leave one peach per 6 to 8 inches of twig. In many cases, however, it is best to thin according to leaf area, bearing capacity, and tree vigor, rather than according to a fixed spacing. For example, after a spring freeze the only blossoms left alive may be those at the base of the terminal shoots. If this occurs, the fruits should not be thinned even if they touch one another, because the leaf area on the tree will be sufficient to handle all the remaining peaches.

It takes about 35 healthy, green leaves to produce 1 peach of good size and quality. Leaf area can provide a fairly accurate thinning guide when trees have an uneven set of fruit.

Hand thinning is the usual practice, but it requires a considerable amount of labor. Some growers use poles to speed up the operation. With this method, poles that have a 12-inch piece of hard rubber on one end are used to knock the excess fruit from the trees. Fruit is removed by tapping the branches with the pole.

Some growers reduce the number of peaches that will be produced by pruning off a large number of shoots either before or at blossom time. Pruning done largely to thin the peach crop should be well distributed throughout the tree.

Blossoms also can be thinned by spraying a high-pressure stream of water on the trees when they are in full bloom. Remove the swivel (rotating disk) from a sprayer and crisscross the limbs with a stream of water delivered at 600 pounds of

TABLE 1.—*Effects of thinning time on fruit size and maturity of Redhaven peaches*

[For each thinning period, 12 trees were selected at random in the orchard]

Thinning period (weeks after bloom)	Fruit maturing early	Fruit per bushel	Yield per tree
	Percent	*Number*	*Bushels*
0	67	156	5.9
2	53	163	5.5
4	40	171	5.5
6	33	177	5.4
8	28	187	5.3
10	24	204	4.6
12	18	217	4.2

pressure. About half of the blossoms should be removed. Follow this with some hand thining at the usual time.

Although several chemical sprays have been tested for blossom thinning, none are dependable enough for practical use on peach trees.

FERTILIZER

In most peach orchards east of the Rocky Mountains, some fertilizer is needed to stimulate the production of high-quality fruit. Nitrogen is the main element lacking, but in some orchards other fertilizer elements may be needed to give the peach trees a complete balance of nutrients.

Nitrogen can be added safely to the soil in fall or early spring. Treatments that liberate abundant amounts of nitrogen in midsummer should be avoided because they may cause delayed maturity, poor fruit coloring, and a reduction in winter hardiness. Nitrate of soda, ammonium nitrate, and urea are excellent sources of nitrogen for peaches because they are very soluble in water and will penetrate the soil to the tree roots soon after rain or irrigation.

Nitrogen requirements vary considerably from area to area. Use local recommendations as a guide when purchasing and applying nitrogen.

Peach trees in much of the Atlantic Coastal Plain often need additional potassium. Potassium deficiency usually can be controlled by applying 2 to 4 pounds of either muriate or sulfate of potash per tree in early spring.

Although the phosphorus content of peach orchard soil often is low, it rarely is low enough to be a limiting element in the production of peaches.

Magnesium deficiency may occur on sandy Coastal Plains soils following heavy application of potassuim. Foliar spraying with about 10 pounds of magnesium sulfate (epsom salts) per 100 gallons of water usually gives prompt control. Soil application of 2 tons of dolomitic limestone per acre will control the deficiency within a few years.

Coastal Plains soils may become highly acid when large amounts of

sulfur are used to spray peach trees for disease control. Soil acidity is best corrected by adding limestone according to local recommendations.

Deficiencies of zinc, boron, or manganese may be a problem in some orchards. These deficiencies can be controlled by foliar sprays. Follow local recommendations when purchasing and applying these chemicals.

SOIL MANAGEMENT

In most peach-growing areas, the soil is cultivated in spring and early summer and seeded to a cover crop in late summer. This system of soil management retards erosion, helps maintain or increase the organic matter in the soil, and aids in water penetration.

A good cover crop should protect the soil during the fall and winter months, but it should not compete with the trees for moisture and nutrients during the growing season. Rye is commonly used because it makes good growth during the fall and winter months. Spring oats, millet, and other crops that winterkill also make satisfactory cover crops.

To promote water penetration and avoid erosion, leave as much of the cover crop on the soil surface as possible when you cultivate in the spring. If rye is used as a cover crop, disk it under before it starts to compete with the trees (figs. 7 and 8).

In areas where soil erosion is a major problem, it may be advisable to grow a summer cover crop even though it will compete with the trees and may reduce fruit production. Late varieties of crotalaria and buckwheat make excellent summer cover crops because they make most of their growth after medium-early peach varieties are harvested.

Where root-knot nematodes are serious pests in peach orchards, nematode-susceptible cover crops, including cowpeas, vetch, rye, and Austrian winter peas, should be avoided. Resistant crops, including crotalaria for late summer and oats for winter cover, should be planted. If soil erosion is not a problem, clean cultivation throughout most of the year is recommended.

A permanent cover of sod is satisfactory in areas where abundant water is available from rain, irrigation, or an unusually deep soil. In most areas, however, a permanent sod cover should be avoided because it usually reduces tree growth and fruit production.

WEED CONTROL

Peach trees cannot successfully compete with weeds for moisture and nutrients. Even the very low-growing weed grasses cause severe reductions in growth rate of new plantings. Weeds, therefore, must be controlled in peach orchards for maximum fruit yields and quality.

Cultural, mechanical, and chemical weed-control methods are usually combined for best results. The method, or combination of methods, to be used depends on soil composition, lay of the land, and kind of weeds growing in the orchard.

Where permanent sod cover is used to control soil erosion, woody weeds (such as poison ivy, brambles,

and honeysuckle) and some perennial weed grasses often are serious problems. Although herbicides that control woody weeds are available, peach trees are not sufficiently tolerant of the herbicides to permit their use. Thus woody weeds must be removed by repeated mechanical or hand clipping. Some of the perennial weed grasses (bermudagrass, johnsongrass, quackgrass, for example) in well-established orchards can be controlled by dalapon herbicide sprays applied as spot treatments on the actively growing grasses. Spray only the infested areas to avoid excessive injury to the established sod grasses. Keep the

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Figure 7.—Rye cover crop in peach orchard ready for early spring disking.

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Figure 8.—The rye cover crop in this orchard has been disked down correctly. The large amount of cover remaining on the soil surface will help promote water penetration and reduce erosion.

spray at least 3 feet from the tree trunks. Use a coarse spray to avoid drift. Follow local recommendations when purchasing and applying dalapon.

In peach-growing areas where soil erosion is not a problem, clean cultivation can be effectively combined with the use of such herbicides as dichlobenil, CIPC+DNBP+oil, amazine, or diphenamid for control of many annual and some perennial weeds. Follow local recommendations when purchasing and applying these herbicides; and observe all of the precautions and directions on the manufacturer's label.

HARVESTING

The stage for picking peaches depends mainly on how the peaches are marketed. Peaches grown for nearby marketing can be allowed to become nearly tree ripe before being picked. Peaches grown for shipping should be picked in the firm-ripe stage.

Standards of maturity for freestone varieties can be determined by the change of the peach's ground color from green to yellow, and by its flesh firmness as determined by a Magness-Taylor pressure tester.

For example, Elberta peaches in the firm-ripe stage (ground color light green to yellow) that test 10 to 14 pounds on a $\frac{5}{16}$-inch-diameter plunger will hold up in refrigerated shipment for several days and will ripen with satisfactory dessert quality.

Since not all fruits ripen at the same time, several pickings should be made. Pick the largest, best-colored fruit first. Move the peaches to market as soon as possible after picking.

DISEASES

Bacterial and Fungus Diseases

The principal fungus and bacterial diseases of peaches grown east of the Rocky Mountains are brown rot, scab, bacterial spot, and peach leaf curl. Dosages and times to apply chemicals to control these diseases vary from one part of the country to another. Consult your local agricultural agent for recommendations where you live.

Brown Rot

Brown rot, sometimes called gray mold or ripe rot, is a fungus disease that overwinters on rotted fruit and old infections in twigs.

The fungus starts as a small brown spot on green or ripening fruit. It spreads rapidly and rots the entire peach. If the rotted peach remains attached to the tree, it gradually shrinks and dries into a hard, brown to black mummy. Spores produced on the mummy can be carried to healthy fruit by insects, birds, wind, splashing rain, and man.

Mummies left hanging on the trees or lying on the ground should be removed from the orchard or disked under. If allowed to remain they may be a source for blossom infection in the spring. From the infested blossoms, the disease may spread to twigs, and then to ripening fruit (fig. 9).

Apply sulfur, captan, or dichlone dusts or sprays to control brown rot. Begin applications in early spring

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Figure 9.—Peaches covered with spores of the brown rot fungus. The infection spread from the blossoms to the twigs, and then to the fruit.

before blossoms open and at 1- to 2-week intervals thereafter.

Brown rot is less of a problem when the plum curculio and oriental fruit moth, insects that puncture fruit and provide entrance for brown rot spores, are controlled.

Scab

Scab, sometimes called black spot or freckles, is a fungus disease that causes considerable damage in humid peach growing areas.

Peaches infected by the disease have olive green to black spots near the stem. When numerous, the spots run together to form a large scablike area involving as much as half the surface of the peach.

The scab fungus attacks tender, green shoots of the current season. Infected shoots have small, brown, oval cankers. These cankers rarely cause damage to the twigs, but they provide a place for the fungus to overwinter.

To control scab, apply a sulfur spray or dust 2 or 3 times—once two weeks after the shucks drop and at two-week intervals thereafter.

Bacterial Spot

Bacterial spot, sometimes called bacteriosis or bacterial shothole, is present in all peach- and plum-growing areas east of the Rocky Mountains.

The disease infects leaves, fruit, and twigs. Symptoms include a ragged, shothole appearance of leaves, cracked skin on developing fruit, and cankers on twigs. Premature leaf fall often occurs when a large number of leaves are infected.

Although the disease can cause considerable fruit damage, the

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In addition to the widespread peach diseases mentioned here, other fungus and bacterial diseases that may cause trouble in certain areas east of the Rocky Mountains include rust, constriction, crown gall, powdery mildew, dieback, and various types of root rot.

Bacterial and fungus disease problems in peach orchards, and disease control methods, vary considerably from area to area. Your county agricultural agent or State agricultural experiment station can tell you which diseases are likely to be a problem in your area and can recommend methods for their control.

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greatest loss is the devitalization of the tree. In some areas, proper pruning, cultivation, fertilization, and other good management practices will hold the disease in check. But cultural practices alone will not control severe bacterial spot infection, especially where soil improvement is difficult.

In some areas, the use of chemical treatments has been fairly successful in checking bacterial spot. When the disease is severe, however, the best materials available are only about 50 percent effective. A combination zinc sulfate-lime spray provides the most satisfactory results.

Peach Leaf Curl

Peach leaf curl is a fungus disease that overwinters on twigs and buds of peach trees. In the spring, spores of the fungus germinate and infect the young leaves as they begin to develop.

Early appearing leaves infected by the disease have a distinctive red to purplish tint. As the disease progresses, the leaves become thickened, blistered, and distorted; turn reddish yellow or yellowish gray; and later turn brown and drop.

Peach leaf curl can be controlled by spraying the trees with ferbam, dichlone, lime-sulfur, or bordeaux. Only one application is needed. It can be made in fall after the trees have shed their leaves, in winter when the temperature is above freezing, or in spring before the buds begin to swell. Chemical treatments for peach leaf curl control should not be made after leaves start to grow because the disease will not be controlled successfully and the trees may be injured by the chemicals.

Virus Diseases

The major virus diseases of peaches grown east of the Rocky Mountains are peach yellows, little peach, red suture, X-disease, phony disease, and peach rosette.

Peach Yellows

The symptoms of peach yellows include: Premature ripening of fruit; drooping, inward rolling, pale green to yellow leaves; and clusters of yellow-leaved shoots that develop along the trunk and main branches (fig. 10).

The fruit, which ripens from a few days to 3 weeks earlier than normal, has bitter flavor. The peel is commonly spotted with red and purple, and on normally red-colored varieties may be solid purple. Red streaks extend from the pit to the peel, and in red varieties the tissue around the pit is intensely red.

Cultivated and wild plums are common carriers of the yellows virus. Most plum species are not injured by the virus nor do they show any easily recognizable symptoms of yellows. The plum leafhopper spreads the disease.

In localities where yellows virus is widespread, peaches should not be grown within one-half mile of plums. Peach trees infected by the virus should be removed from the orchard as soon as the disease is recognized. Care should be taken to obtain nursery stock and peach budwood from yellows-free sources.

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Figure 10.—Closeup view of the willowy growth arising from a main limb of a tree affected by peach yellows. Note the slenderness of the twigs and the light color, small size, and abundance of leaves. (Courtesy of Illinois Natural History Survey.)

Little Peach

Symptoms of little peach and yellows are sufficiently similar to suggest that they are caused by strains of the same virus. The virus causing little peach, like that causing yellows, infects plums and is transmitted by the same insect. Control for little peach is the same as for yellows, but it is less efficient because the early stages of the disease are more difficult to recognize.

Little peach differs from yellows in certain symptoms: Fruit on trees affected with little peach fails to ripen or ripens late instead of prematurely; the fruit does not have the red color on the peel or in the flesh; there is less yellowing of foliage in early stages of the disease; and the clusters of yellow shoots do not appear along the trunks.

Red Suture

Red suture also belongs to the yellows group. It is known to occur in Michigan, Ohio, Pennsylvania, and Maryland. Leaf and tree symptoms of red suture are similar to those of little peach. The fruit on affected trees ripens prematurely, similar to the fruit symptoms of peach yellows. However, the suture on ripening fruit is often red and unevenly swollen. The control for red suture is the same as for yellows and little peach, but it is less efficient because of the greater difficulty of recognizing diseased trees in early stages.

X-Disease

X-disease usually begins on a few twigs and then spreads irregularly through the peach tree. Leaves on infected twigs appear normal until midsummer, then within a few days, the leaves turn pale green, roll upward, become brittle, and develop irregular yellow and red

spots. Leaves on infected twigs are usually shed progressively from the base toward the tip. Fruits usually shrivel and fall soon after leaf symptoms develop.

Besides peaches, the X-disease virus infects cultivated cherries (sweet and sour) and several wild plum and cherry species. Wild chokecherries are the most commonly infected host. The disease is spread by certain leafhoppers that feed naturally on diseased chokecherries and later on healthy trees.

To control X-disease, remove all infected trees from the orchard and eradicate chokecherries within 500 feet of the orchard. Infected trees do not recover and usually produce no fruit after being diseased 3 or 4 years.

Phony Disease

Phony disease of peaches causes serious losses in southeastern peach-growing areas, particularly in Georgia and Alabama.

Phony disease dwarfs peach trees and causes them to produce an abnormal number of lateral twigs. The flattened leaves produced on these twigs give the trees a dense, dark green appearance. Fruit produced on diseased trees becomes progressively smaller each year. Phony disease does not kill peach trees, but it weakens the trees and makes them susceptible to winter injury and other orchard troubles.

The disease affects all peach varieties. It is spread by several species of large leafhoppers commonly known as sharpshooters. The wild chickasaw plum becomes naturally infected and serves as a reservoir of the virus.

To control the disease, remove all phony-infected trees from the orchard and eradicate wild plums from the vicinity of the orchard. New orchards should not be planted immediately adjacent to old orchards.

Peach Rosette

Peach rosette, another virus disease affecting peaches in the Southeast, is a rapid killer and causes severe losses in areas where diseased trees are left standing.

Symptoms on peaches generally appear in spring or early summer. The first formed leaves turn yellow, and shoots fail to elongate. Later formed leaves are small and, because of shortened shoots, grow into tight rosettes. Yellowing and shedding are progressive from older to younger leaves. Affected trees usually die before the end of the growing season.

The chickasaw plum occasionally becomes infected with the disease. Symptoms are similar to those on peach trees.

Peach rosette can be controlled by prompt removal of diseased trees in and near the orchard.

Several virus diseases affecting peaches grown east of the Rocky Mountains cause only minor losses. These include peach mosaic, rosette mosaic, ring spot, necrotic leaf spot, line pattern, and asteroid spot. Your county agricultural agent or State agricultural experiment station can tell you which of these virus diseases are likely to be a problem in your area and can recommend methods for their control.

INSECTS

The common insect pests of peaches grown east of the Rocky Mountains include the plum curculio, peach tree borer, lesser peach tree borer, San Jose scale, oriental fruit moth, and a group of sucking bugs.

Plum Curculio

The plum curculio is a small beetle that hibernates in trash in the orchard or near it. Early in spring, the curculios move to the trees and insert eggs beneath the skin of young peaches. The curculio larvae, or grubs, feed within the peaches for several weeks. The mature grubs leave the fruit and go into the ground, and later emerge as adult beetles. In the South, a second generation of grubs infests midseason peach varieties.

The procedure for control varies somewhat according to local conditions. Usually, an insecticide is applied three or four times during the month following petal fall. Where two generations occur in a season, one or two additional spray applications may be needed during the month before picking time.

Parathion or azinphosmethyl (Guthion), are commonly used by commercial peach growers to control the plum curculio. Home gardeners commonly use malathion or methoxychlor.

Peach Tree Borer

The peach tree borer is a white worm, about an inch long, that works underneath the bark of peach trees near the ground line. The burrowing of the worms often injures the tree, and in some cases may even kill it.

In northern peach-growing areas, adult moths appear in the orchard during July and August. In southern peach-growing areas, most of the moths appear during August and September, but a few may appear as early as May or June in the southern part of the Gulf States.

Egg laying begins shortly after the moths appear. After hatching, the young larvae move to the lower part of the trunk where they enter the bark.

Peach tree borers can be controlled by spraying the trunks of the trees with DDT, parathion, azinphosmethyl, or endosulfan (Thiodan). Spray two to four times at 3- to 4-week intervals during the egg-laying period.

Soil applications of paradichlorobenzene can be used as an alternative control method. Treatments should be made from about early September in New England to late October in southern Georgia. Apply the chemical in a ring around the trunk 1 to 2 inches from the base of the tree. Cover the chemical with a mound of soil. Paradichlorobenzene should not be used on trees less than 4 years old.

Insecticides listed in this publication are referred to by their common names wherever possible. Mention of a trade name does not constitute a guaranty or warranty of the product named and does not signify that this product is approved to the exclusion of other comparable products.

Lesser Peach Tree Borer

The lesser peach tree borer is similar to the peach tree borer, but it attacks the upper trunk and limbs.

Adult moths appear early in the spring. There is one generation per year in the North and two per year in the South.

The lesser peach tree borer can be controlled by spraying the trunk and lower parts of large limbs with azinphosmethyl, parathion, endosulfan, or malathion. In most areas the control program is the same as for the peach tree borer, except for one additional spray application about a month earlier.

San Jose Scale

The San Jose scale is a tiny insect that lives on trees under a small, grayish, scalelike covering. Small reddish discolorations often appear at the point of feeding. Heavily infested trees have a roughened, grayish appearance.

All stages of the scale are present at most times of the year, but those that are partly grown survive winter most successfully. One or two generations occur in northern peach-growing areas, three or more generations occur farther south.

The San Jose scale can be controlled in early spring, before the buds open, by spraying with a mineral oil emulsion. An alternative control treatment can be made in spring or summer by spraying with azinphosmethyl, malathion, or parathion. Apply the spray when young crawlers are active.

Oriental Fruit Moth

The larvae of the oriental fruit moth are brown-headed, pinkish-white worms that feed in twigs and fruit.

The adult moths first appear about the time peach trees are in bloom. The females lay their eggs on the leaves. The larvae feed mostly in tender terminal twigs in spring and early summer. After the twigs harden, the larvae feed in maturing fruit. When full grown they leave the twigs or fruit to spin cocoons in a protected place on the tree or ground. Four or five generations usually occur each year. The insect overwinters as a full-grown larva.

In most areas, the spray program used to control the plum curculio will hold the oriental fruit moth in check. If direct measures are needed in the early part of the growing season, apply DDT, azinphosmethyl or parathion, three times at 10-day intervals. Make the first application at shuck-split.

Sucking Bugs

The tarnished plant bug and several other species of sucking bugs feed on peach blossoms and newly formed peaches. This feeding causes the fruit to become seriously scarred and distorted.

Sucking bugs live and feed chiefly on weeds and field crops in or near the orchard. They most commonly

feed on peaches for only a short period in spring. Where it is consistent with good horticultural practices, the elimination of weeds and certain cover crops will aid in controlling these pests.

Damage to peaches by tarnished plant bugs can be reduced by spraying the trees with DDT, azinphosmethyl or parathion. The spray should be applied immediately before bloom or just after petal fall. If stinkbugs are present, two or three additional applications may be needed at 10-day intervals.

SELECTION OF VARIETIES

Peach varieties, as based on flesh texture, are classified as melting or nonmelting. The melting varieties are used for dessert and processing. Nonmelting varieties are used almost entirely for processing. Most early-ripening varieties with melting flesh are at least partial clingstones. Most later-ripening melting varieties are freestones. Nonmelting varieties are all clingstones.

Local growing conditions and the market for which peaches are being grown largely determine which varieties to select. For example, if you grow peaches for a nearby market, select a series of high-quality varieties that ripen in sequence.

In this publication only a few of the principal and outstanding varieties are described. Your county agricultural agent or State agricultural experiment station can provide you with specific information on varieties adapted to your area.

Insect problems in peach orchards vary according to seasonal and local conditions. Only general information and recommendations are included in this bulletin. For more detailed information—

- See Agriculture Information Bulletin 272, "Insect Pests of the Peach East of the Rocky Mountains," available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at 15 cents per copy; *or*—
- Get in touch with your county agricultural agent or State agricultural experiment station.

Standard Commercial Varieties

The following peach varieties, listed in approximate order of ripening, are suggested for general commercial production east of the Rocky Mountains:

DIXIRED.—Very early, ripens 5 to 6 weeks before Elberta. Fruit medium sized with bright red skin. Flesh yellow, medium firm, melting, cling. Good for very early shipping or for local marketing where earliness is important and a cling variety is acceptable.

REDHAVEN.—Early, ripens 4 to 5 weeks before Elberta. Fruit medium sized with attractive, bright red skin. Flesh yellow, usually free when ripe. Flower buds moderately hardy. Excellent for canning and freezing. Early and heavy thinning required.

TRIOGEM.—Early, ripens 3 weeks before Elberta. Fruit medium sized with attractive red and yellow skin. Flesh yellow, fine textured, firm,

usually free. Flower buds sensitive to low temperatures. Early and heavy thinning required.

SUNHIGH.—Early-midseason, ripens about 2 to 2½ weeks before Elberta. Fruit large sized with attractive, light red skin. Flesh yellow, attractive, fine textured, firm, usually free. Buds fairly hardy to low winter temperatures, but sensitive to low spring temperatures. Chilling requirement short.

REDGLOBE.—Early-midseason, ripens 2 weeks before Elberta. Fruit medium to large sized with highly colored skin. Flesh yellow, firm, fine textured, free. Dependable producer. Good shipping peach.

BELLE (BELLE OF GEORGIA).—Midseason, ripens 1 week before Elberta. Fruit large sized. Skin sometimes lacking in color. Flesh white, high quality, usually free. Flower buds hardy. The preferred white variety ripening before Elberta.

SULLIVANS EARLY ELBERTA.—Midseason, ripens 1 week before Elberta. Similar to Elberta in all respects except earlier ripening. One of the most extensively planted varieties in the past.

ELBERTA.—Fruit large sized with red blush. Flesh yellow, fair to good quality, free. Trees productive and vigorous. By far the leading peach variety in the United States even though it is being replaced in many orchards by midseason varieties having superior quality, hardiness, and skin color.

RIO OSO GEM.—Late, ripens 1 week after Elberta. Fruit large sized. Skin has medium to bright blush. Flesh yellow, firm, good quality, free. Susceptible to bacterial spot. Popular with growers because of fruit size, firmness, attractiveness, and time of ripening.

Special-Purpose Varieties

Varieties suggested for special purposes, or for certain localities, or to extend the ripening season are listed in approximate order of ripening:

MAYFLOWER.—Very early, ripens about 8 weeks before Elberta. Fruit small sized with red skin. Flesh white, soft, juicy, cling. Yields usually low. Early ripening the only important merit.

EARLIRED.—Very early, ripens at least 6 weeks before Elberta. Fruit medium sized. Flesh attractive, good flavor, firm, semifree.

HILAND.—Very early, ripens 6 weeks before Elberta. Fruit medium to large sized. Skin has a light red blush. Flesh yellow, medium firm, melting, cling. Trees require short chilling. For very early shipping in southern peach areas.

CARDINAL.—Very early, ripens 6 weeks before Elberta. Fruit medium sized with bright, attractive skin. Flesh yellow, firm, melting, cling. Chilling requirement fairly short. For early shipping in southern peach areas.

MAYGOLD.—Very early, ripens 5 to 6 weeks before Elberta. Fruit medium sized with well-colored skin. Flesh yellow, medium firm, melting, cling. For early shipping in southern peach areas. Will produce fruit farther south than either Hiland or Redcap.

ERLY-RED-FRE.—Very early,

ripens 5 to 6 weeks before Elberta. Fruit large sized for early season. Skin partly red. Flesh white, often free when fully ripe. Trees productive and winter hardy.

SUNHAVEN.—Very early, ripens 5 to 6 weeks before Elberta. Fruit medium sized, round, but may be rough in northern peach-growing areas. Skin attractive bright red with excellent undercolor. Flesh yellow, firm, semifree when ripe.

CORONET.—Early, ripens 4 to 5 weeks before Elberta. Fruit medium sized. Skin mostly red and very bright. Flesh yellow, firm, usually free. Chilling requirement short. Early flower development may result in spring frost damage. An attractive shipping peach often used to follow Redcap harvest in the South.

DIXIGEM.—Early, ripens 4 to 5 weeks before Elberta. Fruit medium to large sized. Skin has bright yellow ground color and light to medium red blush. Flesh yellow, firm, fine textured, usually free when ripe.

RARITAN ROSE.—Early, ripens 4 weeks before Elberta. Fruit medium sized with attractive red skin. Flesh white, fine textured, free. Trees hardy and productive. Has special merit for local sale where an early white variety is desirable.

RANGER.—Early, ripens 3 to 4 weeks before Elberta. Fruit medium to large sized. Flesh yellow, firm, free. Blooms late and requires considerable chilling. Resistant to bacterial spot. Dependable producer over wide area.

SOUTHLAND.—Early - midseason, ripens 2 to 3 weeks before Elberta. Fruit medium to large sized, round. Skin has medium blush. Chilling requirement short.

AMBERGEM.—Early - midseason, ripens 2 weeks before Elberta. Fruit medium sized, round, yellow skin. Flesh yellow, firm, fine textured, nonmelting, cling. Flower buds hardy. Trees productive. Usually planted for canning. Preferable to western clingstone varieties for planting east of the Rocky Mountains.

CHAMPION.—Midseason, ripens 1 week before Elberta. Fruit large sized. Skin has medium to bright blush. Flesh white, fine textured, lacks firmness, usually free. Flower buds very hardy. Susceptible to brown rot.

REDSKIN.—Midseason, ripens about the same time as Elberta. Fruit large sized, round. Skin attractive and almost solid, bright red. Flesh yellow, firm, free. Good for freezing and canning. Planted to replace Elberta in many orchards because of its attractiveness and quality.

J. H. HALE.—Midseason, ripens with or just after Elberta. Fruit large sized with attractive red skin. Flesh yellow, firm, fine textured, free. Flower buds tender. Cross-pollination necessary to fruit set. Trees lack vigor, often unproductive, and very susceptible to bacterial spot. Fruit may bring a premium because of high quality but the trees are often unprofitable in eastern States.

AFTERGLOW.—Late, ripens nearly a week after Elberta. Fruit large sized. Skin has medium to light blush. Flesh yellow, firm, free. Flower buds fairly tender. Trees

moderately vigorous and productive.

LATEROSE.—Late, ripens about 10 days after Elberta. Fruit medium to large sized. Skin has attractive red blush. Flesh white, medium firm, fine textured, free. Trees vigorous and productive. A good white variety to follows the Elberta season.

LIZZIE.—Late, ripens 2 weeks after Elberta. Fruit medium sized. Skin lacks color. Flesh yellow, medium firm, fair to good quality, free. Flower buds tender.

AUTUMN.—Very late, ripens 3 to 4 weeks after Elberta. Fruit medium to large sized. Skin color often dull. Flesh yellow, firm, free. Although it often lacks attractiveness and high flavor, Autumn is a satisfactory late variety.

PRECAUTIONS

Many pesticides used improperly can be injurious to man and animals. Use them only when needed and handle them with care. Follow the directions and heed all precautions on the labels.

Some States have special restrictions on the use of certain pesticides. Before applying pesticides, check State and local regulations.

Keep pesticides in closed, well-labeled containers in a dry place. Store them where they will not contaminate food or feed, and where children and animals cannot reach them. Promptly dispose of empty pesticide containers; do not use for any other purpose.

When handling a pesticide, wear clean, dry clothing.

Avoid repeated or prolonged contact of pesticide with your skin.

Wear protective clothing and equipment if specified on the container label. Avoid prolonged inhalation of pesticide dusts or mists.

Avoid spilling a pesticide on your skin, and keep it out of your eyes, nose, and mouth. If you spill any on your skin or clothing, remove contaminated clothing immediately and wash the skin thoroughly with soap and water. Launder the clothing before wearing it again.

After handling a pesticide, do not eat, drink, or smoke until you have washed your hands and face. Wash any exposed skin immediately after applying a pesticide.

Parathion is extremely poisonous; it should not be used in small home plantings, and should be applied only by a person familiar with its hazards and who will assume full responsibility for its safe use. Endosulfan can be absorbed through the skin in harmful quantities. When working with these insecticides in any form, take the same precautions as when handling concentrates.

Parathion, azinphosmethyl, and endosulfan may be harmful to birds and mammals in treated orchards. Do not allow livestock to feed in sprayed orchards.

Allow the following interval between the last insecticide application and peach harvest: 7 days for malathion; 21 days for parathion, azinphosmethyl, and methoxychlor; and 30 days for DDT and endosulfan.

Avoid drift of pesticide to nearby wildlife habitats, bee yards, crops, or livestock. Do not apply pesticides under conditions favoring drift from the area to be treated.

Many pesticides are highly toxic to fish and aquatic animals. Keep them out of all water sources such as ponds, streams, and wells. Do not clean spraying equipment or dump excess spray material near such water.

Do not apply insecticides to plants during hours when honey bees and other pollinating insects are visiting them.

Have empty pesticide containers buried at a sanitary land-fill dump, or crush and bury them at least 18 inches deep in a level, isolated place where they will not contaminate water supplies.

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